

## What ends a worry bout? An analysis of changes in mood and stop rule use across the catastrophising interview task

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**WHAT ENDS A WORRY BOUT? AN ANALYSIS OF CHANGES IN MOOD  
AND STOP RULE USE ACROSS THE CATASTROPHISING INTERVIEW  
TASK**

**By**

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**Running Head:** Ending a worry bout

## **ABSTRACT**

This paper reports the results of two experiments designed to test predictions from the mood-as-input hypothesis about the factors that contribute to the ending of a worry bout. Experiment 1 looked at changes in self-reported mood across a catastrophising interview task. Experiment 2 investigated whether there were any changes in stop rule deployment between the beginning and end of a catastrophising interview task. Experiment 1 demonstrated that worriers tended to show increases in negative mood and decreases in positive mood over the course of catastrophising. In Experiment 2, participants exhibited a significant shift away from endorsing the use of ‘as many as can’ stop rules and a significant increasing tendency to endorse the use of ‘feel like continuing’ stop rules over the course of catastrophising. These results suggest that worriers exhibit increases in negative mood across the worry bout, but shift from the use of ‘as many as can’ to ‘feel like continuing’ stop rules. Mood-as-input hypothesis predicts that if high worriers ask the question “do I feel like continuing?” in the context of increasing negative mood, this will imply that the activity is no longer enjoyable or profitable and should be terminated. The results are discussed in the context of mood-as-input accounts of pathological worrying and the therapeutic implications of these findings are reviewed.

Chronic worry is known to be a feature associated with most of the anxiety disorders and most specifically with Generalized Anxiety Disorder (GAD) (Brown, Antony & Barlow, 1992). In particular, since the advent of Diagnostic and Statistical Manual of Mental Disorders (third edition; DSM-III; American Psychiatric Association, 1980), worrying has been the central diagnostic feature of GAD. According to the most recent diagnostic categorization, the cardinal diagnostic feature of GAD is “excessive anxiety and worry (apprehensive expectation)...which the individual finds difficult to control” (DSM-IV-TR, APA, 2000, p476).

One form in which uncontrollable worrying occurs in individuals suffering GAD is through processes of catastrophising (Vasey & Borkovec, 1992; Davey & Levy, 1998; Breitholtz, Westling & Ost, 1998). Catastrophising is the tendency of individuals to apply a ‘what if...?’ questioning style to potential problematic features of their life. Rather than bringing the problem to a satisfactory close, however, this process usually leads the worrier to persevere at the task and to perceive progressively worse and worse outcomes to the worry topic (Vasey & Borkovec, 1992; Kendall & Ingram, 1987; Davey & Levy, 1998). Using the cognitive therapy technique of decatastrophising (Kendall & Ingram, 1987), Vasey & Borkovec (1992) found that chronic worriers generated significantly more catastrophising steps than nonworriers and reported a significant increase in subjective discomfort as catastrophising progressed. Worriers also rated the events in the catastrophising sequences as significantly more likely to occur than did nonworriers.

Of particular theoretical importance to an understanding of perseverative anxiety-based disorders such as GAD is the need to understand the cognitive processes that lead the worrier to persist in generating catastrophising steps when the nonworrier will abandon this process at a significantly earlier stage. One theory that has been applied to this question is the mood-as-input hypothesis (Startup & Davey, 2001; Davey, 2006).

This type of account can be explained by describing a study by Martin et al. (1993). They induced either positive or negative moods in their participants and then asked them to generate a list of birds' names (an item generation task). Half of the participants were asked to stop the task when they no longer felt like doing it (a "feel like continuing" stop rule, FL), whereas the other half were asked to stop when they thought they had generated as many birds' names as they could (an "as many as can" stop rule, AMA). Martin et al. found that the effect of mood was dependent on the stop rule that participants had been asked to use. For the "feel like continuing" stop rule, participants in the positive mood persisted at the task for significantly longer than those in the negative mood. However, participants using the "as many as can" stop rule persevered for significantly longer when they were in a negative mood. Martin et al. (1993) interpreted these findings in mood-as-input terms where participants interpret their mood in relation to the stop rule. In the "feel like continuing" condition, their negative mood tells them to stop. In the "as many as can" condition, their negative mood tells them they are not satisfied with the number of items they have generated, and so should persist at the task for longer.

The mood-as-input account suggests that the worrier's negative mood interacts with the 'stop rules' that the worrier brings to the worry task to determine perseverance at that task. For instance, worrying is an open-ended task that has no obvious or clear end point. This being the case, individuals commencing a worry bout will usually bring their own set of implicit stop rules to the task, and the individual will have to make some decisions during the course of the worry episode about whether to continue or to stop (depending on whether they feel their criteria for stopping have been met). When applied to catastrophic worrying, the mood-as-input hypothesis assumes that worriers are in a significantly more negative mood state than nonworriers, and that they use relatively stringent 'as many as can' stop rules for judging whether to terminate the catastrophising

task (cf. Startup & Davey, 2001; Davey, Field & Startup, 2003). Thus, when catastrophising, worriers are continually asking themselves (either implicitly or explicitly) whether they have successfully dealt with the problem, but their negative mood provides them with information that they have not and this results in perseveration at the task.

Facts that are consistent with the mood-as-input account of catastrophic worrying are (1) worriers are usually in a significantly more negative mood than nonworriers when they commence a worry bout (Vasey & Borkovec, 1992), (2) worriers experience endemic negative mood which is normally at significantly higher levels than is experienced by nonworriers (Davey, Hampton, Farrell & Davidson, 1992; Meyer, Miller, Metzger & Borkovec, 1990; Metzger, Miller, Chen, Sofka & Borkovec, 1990), and this negative mood will often manifest itself as higher levels of both anxiety and depression, (3) ‘as many as can’ stop rules are usually deployed by chronic worriers prior to a catastrophising episode (Startup & Davey, 2003), they appear to be related to beliefs about the important functions that the worry process serves (Davey, Tallis & Capuzzo, 1996), and their reported usage is associated with perseveration on a catastrophising task. (Davey, Startup, MacDonald, Jenkins & Patterson, 2005).

While the mood-as-input hypothesis seems able to explain the perseveration of worry bouts in worriers, it is still the case that worriers do eventually terminate their worry bout. So what factors contribute to this termination? Since negative mood combined with deployment of an ‘as many as can’ stop rule drives perseveration, how might mood-as-input hypothesis explain the fact that worriers do stop eventually? Mood-as-input theory makes two predictions in this respect: (1) worriers will either change their mood from negative to positive during the course of the worry bout, so that the positive mood now provides information implying that the worrier has completed the task successfully and can finish, or (2) worriers will change their stop rules (but not their

negative mood) from ‘as many as can’ to ‘feel like’ so that the negative mood now implies that the worrier ‘does not feel like continuing any further’.

This paper describes two experiments designed to test these predictions from mood-as-input hypothesis. Experiment 1 looks at changes in self-reported mood during a catastrophising task to determine whether termination of the bout is associated with a shift from negative to positive mood. Experiment 2 investigated whether there were any changes in stop rule use during a catastrophising task, and in particular, whether worriers shifted from deploying ‘as many as can’ stop rules to ‘feel like continuing’ stop rules during the course of the task. Identifying the factors that cause an individual to terminate a worry task is not only of theoretical interest, it may also have significant importance for interventions designed to help pathological worriers control their worrying.

## **EXPERIMENT 1**

Mood-as-input hypothesis predicts that perseverative worrying will be determined by the use of ‘as many as can’ stop rules in the presence of a negative mood. First, there is considerable evidence that pathological worriers do commence a worry bout in a mood that is significantly more negative than that reported in nonworriers (Startup & Davey, 2001). Frequent worriers also score significantly higher on trait measures of negative mood than low worriers (Davey, Hampton, Farrell & Davidson, 1992; Meyer, Miller, Metzger & Borkovec, 1990; Metzger, Miller, Chen, Sofka & Borkovec, 1990). What is also interesting in this context is that while worriers commence the worry bout in a negative mood, their mood appears to become more negative as catastrophising develops. For example, worriers appear to experience more and more emotional discomfort as their catastrophising progresses (Vasey & Borkovec, 1992), and this would suggest that the increasing levels of negative mood should be interpreted as stronger and

stronger evidence to continue worrying. This appears to be contrary to mood-as-input predictions because, although worriers appear to have persevered with the bout for longer than nonworriers, negative mood is apparently at its strongest at the point when the worrier abandons the bout.

Experiment 1 is designed to systematically investigate the course of self-reported mood across a catastrophising bout. Participants were divided into 3 groups who differed on the basis of the stop rule they were asked to use at the outset of catastrophising ('as many as can', 'feel like continuing' or no stop rule). This manipulation was included to determine whether the nature of the stop rule deployed at the outset of catastrophising had a confounding effect on the course of mood throughout catastrophising. For example, adopting 'as many as can' stop rules may itself generate negative mood because of the need for the participant to systematically process their worry to ensure it is fully considered. In contrast, adopting 'feel like continuing' stop rules may help the participant to avoid stressful worry-based cognitions and disengage from the worry process before negative mood increases significantly.

## **METHOD**

### **Participants**

The participants consisted of 60 (50 female and 10 male) undergraduate and postgraduate students from the University of Sussex with an age range of 18-61 years and a mean age of 25.2 years (SD 8.2 years). Participants were recruited on a voluntary basis and were unaware of the aims and purpose of the study.



## Procedure

Participants were assigned randomly to one of three groups. These groups were labeled AMA ( $n = 20$ ), FL ( $n = 20$ ) and no stop rule ( $n = 20$ ) depending on the stop rule they were to be using. Participants were tested individually in a small room containing an angle-poise lamp and an audiocassette player with headphones. Participants were instructed that they would be required to complete two questionnaires and then partake in a short interview.

**Stage 1:** All participants were asked to fill in an informed consent form and then asked to complete the PSWQ as a measure of trait worry, and the HADS as a measure of trait anxiety and depression. The Penn State Worry Questionnaire (Meyer, Miller, Metzger and Borkovec, 1990) is a valid measure of trait worrying that is unaffected by the content of the worry (Molina & Borkovec, 1994; Davey, 1993), and the Hospital Anxiety and Depression Inventory (HADS; Zigmond & Snaith, 1983) is a valid measure of the severity of depressive and anxious symptoms

**Stage 2:** Prior to the catastrophising interview, participants were also asked to rate their current levels of anxiety, sadness, and happiness on separate visual analogue 100-point scales (where 0=not at all anxious/sad/happy and 100=extremely anxious/sad/happy). The VAS mood measures asked participants to “..mark a cross along the scale to indicate how sad/happy/anxious you feel at the present moment”. Participants who had been randomly assigned either the FL or AMA stop rule condition were then presented with written and verbal instructions asking them to adopt the required stop rule during the catastrophising interview task. Those receiving the FL instruction were told: “As you take part in the interview, please ask yourself ‘Do I feel like I want to continue with this

interview?’ If the answer is ‘yes’, then continue generating responses. If the answer is ‘no’, then stop. Stop when you no longer feel like generating responses.” Those receiving the AMA instructions were told: “As you take part in the interview please ask yourself ‘Have I reached the goal of sufficiently exploring my worry?’ If the answer is ‘yes’, then stop. If the answer is ‘no’, then continue generating responses. Stop when you have sufficiently explored your worry.”

**Stage 3:** Participants were then asked what their main worry was at the current time, and this worry was subjected to a catastrophising interview. The catastrophising interview is modeled on that reported by Vasey & Borkovec (1992) and contains the methodological refinements introduced by Davey & Levy (1998) and Startup & Davey (2001). The interview begins with the experimenter asking the question “what is it that worries you about (X)?”, where X is the participant’s current main worry. The experimenter then repeats this question substituting the participant’s answer to the first question for X. For example, if the individual’s current worry is exams, the first question will be “what is it that worries you about exams?”. If the participant replies “I am worried that I may fail them”, the experimenter then asks “what is it that worries you about failing your exams?”, if the participant replies “I won’t get a good job”, the experimenter then asks “what is it that worries you about not getting a good job?”, and so on. This standardized form of questioning is adopted throughout the catastrophising interview to avoid any experimenter bias in the way questions are worded. The refinements to the procedure originally designed by Vasey & Borkovec (1992) were (1) participants were asked to write down their response to each catastrophising step on a response sheet, (2) they were encouraged to keep each response no longer than a sentence that fitted the appropriate space on the response sheet, and (3) at the outset of the catastrophising procedure, all

participants were provided with examples of the initial steps in a catastrophising sequence, so that they were aware of what was required. In the present study, the catastrophising interview was terminated when the participant either admitted they could think of no more responses or did not want to continue (although participants are not told at the outset that these were the criteria for ending the interview). The dependent variable and measure of perseverance is the number of steps that the participant emits before running out of responses and terminating the interview.

After every two catastrophising steps all participants were asked to pause from the catastrophizing interview and complete the VAS mood measures described in Stage 2. Participants were also asked to complete these mood measures once more immediately after completing the catastrophising interview.

**Stage 4:** Participants were fully debriefed on the aims and purpose of the study and thanked for their participation

## RESULTS

**Trait measures:** The mean PSWQ , HADS Anxiety and HADS Depression scores for all participants were 51.48 (SD=11.0), 8.78 (SD=4.0), and 3.48 (SD=2.8) respectively. There were no significant differences between the three stop rule groups in scores on PSWQ [ $F(2,59)=1.37, p>.2$ ], HADS Anxiety [ $F(2,59)=1.63, p>.2$ ] and HADS Depression [ $F(2,59)=0.15, p>.8$ ]. Over all participants PSWQ score was significantly correlated with both HADS Anxiety [ $r(60)=.49, p<.001$ ] and HADS Depression [ $r(60)=.21, p<.05$ ] scores, indicating that high worriers scored higher on both anxiety and depression scores.

**Mood changes across the catastrophising task:** Because the length of the catastrophising interview differed across participants, a measure of changes in mood across the catastrophising task was calculated by taking a difference score for each of the three mood measures. Difference scores were calculated by subtracting the mood score at the termination of the task from the mood score at the outset of the task.

Difference scores for the sadness measure were significantly correlated with PSWQ scores across all participants [ $r(60) = .23, p < .05$ ] indicating that sad mood increased across the catastrophising task as a function of trait worrying as measured by the PSWQ – high worriers showed a greater increase in sadness across the task compared with low worriers. Similarly, difference scores for the happiness measure were significantly inversely correlated with PSWQ scores [ $r(60) = -.21, p < .05$ ], indicating that happy mood decreased across the catastrophising task as a function of PSWQ score – high worriers showed a greater decrease in happiness across the task than low worriers. There was no significant correlation between PSWQ scores and anxiety difference scores [ $r(60) = .15, p > .1$ ]. There were no significant effects of stop rule group on sadness difference scores [ $F(2,59) = .16, p > .8$ ], anxiety difference scores [ $F(2,59) = .16, p > .8$ ] or happiness difference scores [ $F(2,59) = .02, p > .9$ ], suggesting that mood changes across the catastrophising task were unaffected by the stop rule adopted by the participants.

In order to illustrate these changes in mood across the catastrophising task in high and low worriers a median split was carried out across all 60 participants on the PSWQ to create groups with high or low worry scores. The mean PSWQ score for high worriers was 59.48 (SD=6.7, range 51-77) and for low worriers 42.93 (SD=8.02, range 29-50). Figure 1 shows mood difference scores for the three mood measures as a function of stop rule group. This figure illustrates how negative mood tends to increase and positive mood tends to decrease across the catastrophising task in high worriers and changes less so in low worriers.

**Catastrophising steps:** The mean number of catastrophising steps emitted by the three stop rule groups were AMA, mean 6.1 (SD=2.6), FL, mean 8.6 (SD=5.4) and no stop rule group, mean 9.7 (SD=3.2). There was a significant difference between groups [ $F(2,59)=4.5, p<.02$ ] in which the no stop rule group emitted more catastrophising steps than either the AMA or FL group (Bonferroni pairwise comparisons both  $ps<.05$ ). However, across all participants, the correlations between mood difference scores and number of catastrophising steps were all nonsignificant (sadness difference score,  $r[60]=.03, p>.3$ , anxiety difference score,  $r[60]=-.04, p>.3$ , happiness difference score,  $r[60]=-.10, p>.2$ ). When the number of catastrophising steps was entered as a covariate into correlations between PSWQ score and mood difference scores, the inverse correlation between PSWQ and happiness difference score still remained significant ( $p<.05$ ), but the correlation between PSWQ and sadness difference score became nonsignificant. This suggests that the length of the catastrophising process may play some role in determining mood changes across the task, but that decreases in happiness across the task as a function of PSWQ score are still significant even when length of the catastrophising bout is taken into account.

## DISCUSSION

Experiment 1 reports increases in negative mood and decreases in positive mood across the catastrophising task as a function of trait worry scores (as measured by the PSWQ). That is, the more an individual can be categorized as a 'high worrier', the more likely they are to exhibit increases in negative mood and decreases in positive mood across the catastrophising task (see Figure 1). These findings are very similar to those reported by Vasey & Borkovec (1992) who found a significant increase in subjective discomfort

across a worry task in those participants labeled as chronic worriers. In the present study, this effect appeared to be independent of the nature of the stop rule that participants were asked to deploy also had no significant effect on mood changes during catastrophising.

Interestingly, levels of sad mood showed an increase across the catastrophising task and not anxious mood. A study by Davey & Levy (1998) may cast some light on this. Using independent raters to rate the content of worry topics and the content of steps in the catastrophising procedure, Davey & Levy (1998) found that, when compared to nonworriers, (1) worriers tended to couch their worries in terms of personal inadequacies, and (2) personal inadequacy became a feature of the catastrophising sequence regardless of the topic being catastrophised (Davey & Levy, 1998, Studies 5 & 6). So, as the catastrophising of a worrier progresses, individual steps within the sequence come to relate more and more to themes of personal inadequacy and personal failure (e.g. “I am worried about being a failure”, “I am worried that I will lose all my friends”, etc.), and these themes are likely to evoke feelings of sadness at loss and failure, and contribute significantly to the increase in sad mood.

This study found no evidence that worriers change their mood during catastrophising from negative to positive. In fact, the general finding was a shift to more negative and less happy mood over the course of the task. One way that mood-as-input hypothesis predicts that a worry bout will be terminated is if the worrier changes their mood from negative to positive while deploying an ‘as many as can’ stop rule. Clearly, the present findings do not support this prediction.

Given that worriers tend to exhibit even higher levels of negative mood after terminating their worry bout than they did at the beginning, then another alternative possibility is that worriers do not change their mood during the course of a worry bout, but change their stop rule from ‘as many as can’ to ‘feel like’. In the context of a stop rule

which asks ‘do I feel like continuing’, high levels of negative mood would indicate ‘no’ and lead to the worrier stopping. Experiment 2 looks at this possibility by monitoring changes in stop rule use across the catastrophising task in high and low worriers.

## **EXPERIMENT 2**

There is good evidence from a number of different sources to suggest that pathological worriers do indeed deploy strict ‘as many as can’ stop rules at the outset of a worry bout. For example, both pathological worriers and individuals diagnosed with GAD hold strong beliefs that worrying is a necessary process that must be undertaken fully and properly in order to avoid future catastrophes (Breitholtz, Westling & Ost, 1998; Davey, Tallis & Capuzzo, 1996; Wells, 1995; Borkovec & Roemer, 1995; Borkovec, Hazlett-Stevens & Diaz, 1999); they also possess elevated evidence requirements for decision making (Tallis, Eysenck & Mathews, 1991) that would indicate that they should explore all possibilities before terminating a worry bout. In addition, trait worry measures have been shown to be related to measures of perfectionism (Pratt, Tallis & Eysenck, 1997; Frost, Lahart & Rosenblate, 1990), feelings of responsibility for negative outcomes (Wells & Papageorgiou, 1998), intolerance of uncertainty (Dugas, Freeston & Ladouceur, 1997; Ladouceur, Talbot & Dugas, 1997), and inflated concerns over mistakes (Stober & Joorman, 2001). All of these dispositional attributes are ones that would indicate that worriers would be driven to deploy ‘as many as can’ stop rules at the outset of worrying in order to ensure that their worrying will meet the rather important goals that worriers require of it.

In a study designed to investigate the type of stop rule used by worriers, Davey, Startup, MacDonald, Jenkins & Patterson (2005) found that (1) scores on a checklist designed to measure deployment of ‘as many as can’ stop rules were highly correlated

with a variety of worry-relevant variables, including measures of trait worry (PSWQ) and beliefs about both the positive and negative consequences of worrying (as measured by the Consequences of Worry Scale – Davey, Tallis & Capuzzo, 1996); scores on the ‘feel like continuing’ sub-scale were unrelated to any worry measures, and (2) the reported use of ‘as many as can’ stop rules was significantly related to perseveration in a worry catastrophising task (as measured by the number of catastrophising steps emitted in a catastrophising interview procedure). These findings suggest that worriers (as defined by high scores on the PSWQ) deploy ‘as many as can’ rather than ‘feel like continuing’ stop rules prior to a worry bout, and this tendency increases with higher scores on the PSWQ.

These findings suggest that worriers do commence worry bouts deploying ‘as many as can’ stop rules, and do so more strictly than nonworriers. Experiment 2 is designed to examine whether the extent to which worriers use either ‘as many as can’ or ‘feel like continuing’ stop rules changes over the course of a catastrophising task. Given that the mood of worriers appears to get worse over the course of a worry bout (Experiment 1), then mood-as-input hypothesis would predict that termination of the bout would require worriers to change their stop rule from ‘as many as can’ to ‘feel like continuing’.

## **METHOD**

### **Participants**

The participants consisted of 49 (30 female and 19 male) undergraduate and postgraduate students from the University of Sussex with an age range of 18-37 years and a mean age



of 24.1 years. Participants were recruited on a voluntary basis and were unaware of the aims and purpose of the study.

## **Procedure**

Participants were tested individually in a small room containing an angle-poise lamp and an audiocassette player with headphones. Participants were instructed that they would be required to complete two questionnaires and then partake in a short interview. The procedure was divided into five stages.

**Stage 1:** After completing an informed consent form, all participants were then asked to complete the PSWQ (as a measure of trait worry), the HADS (as a measure of trait anxiety and depression), and the Worry Stop Rule Checklist (Kato, MacDonald & Davey, unpublished). The Worry Stop Rule Checklist consists of 19 statements that represent the thoughts people have when they are deciding whether to continue or stop worrying. It contains two sub-scales: An 'as many as can' sub-scale (10 items) (example items include "I must find a solution to this problem, so keep thinking about it", "I must try and think about the worst possible outcome, just in case it happens"), and a 'feel like continuing' sub-scale (9 items) (example items include "Don't worry about it, things will get better", "This may never happen so forget about it"). The Worry Stop Rule Checklist was devised by factor analysis, and the 'as many as can' and 'feel like continuing' sub-scales have been shown to have good internal reliability (Cronbach's  $\alpha = .88$  and  $.83$  respectively).

**Stage 2:** Prior to the catastrophising interview, participants were also asked to rate their current levels of anxiety, sadness, and happiness on separate visual analogue 100-point scales (where 0=not at all anxious/sad/happy and 100=extremely anxious/sad/happy).

**Stage 3:** Participants were then asked what their main worry was at the current time, and then completed a VAS version of the Worry Stop Rule Checklist. This VAS scale contained four statements, two taken as representative of ‘as many as can’ and two as representative of ‘feel like continuing’ stop rules. Participants were asked to rate how well, at this point in time, each of the four statements described their attitude towards the worry topic they had nominated at the beginning of Stage 3. Specifically, the participants were asked “Listed below are some thoughts that people have while they are worrying. Put a cross on the line below each statement in relation to how much each statement applies to you at this very moment”. Each item was rated on a 100-point VAS scale.

**Stage 4:** Participants completed the catastrophising interview described more fully in Experiment 1. After every two catastrophising steps all participants were asked to pause from the catastrophizing interview and complete the VAS Worry Stop Rule Checklist described in Stage 3.

**Stage 5:** Participants were again asked to complete the VAS Worry Stop Rule Checklist, and were then debriefed and thanked for their participation.

## RESULTS

**Trait measures:** The mean PSWQ, HADS Anxiety and HADS Depression scores for all participants were 49.02 (SD=11.3), 7.82 (SD=4.4), and 3.84 (SD=3.1) respectively.

Over all participants PSWQ score was significantly correlated with both HADS Anxiety [ $r(49)=.81, p<.001$ ] and HADS Depression [ $r(49)=.57, p<.001$ ] scores, indicating that high worriers scored higher on both anxiety and depression scores. PSWQ scores were also significantly correlated with scores on the AMA scale of the Worry Stop Rule Checklist [ $r(49)=.55, p<.001$ ] and inversely correlated with scores on the FL scale [ $r(49)=-.49, p<.001$ ].

**Mood measures at the outset of catastrophising:** Immediately prior to commencing the catastrophising task, correlations between PSWQ scores and VAS mood measures showed that high worriers reported significantly higher levels than low worriers of anxiety [ $r(49)=.70, p<.001$ ] and sadness [ $r(49)=.48, p<.001$ ], and significantly lower levels of happiness [ $r(49)=-.33, p<.01$ ].

**Catastrophising Steps:** There was also a significant correlation between PSWQ score and the number of catastrophising steps emitted by participants [ $r(49)=.25, p<.05$ ], suggesting that participants with high trait worry scores were more likely to persevere at the catastrophising task than those participants with low scores.

**Stop Rule changes across the catastrophising task:** Changes in reported stop rule use were measured by taking the VAS Worry Stop Rule Checklist scores prior to catastrophising (in Stage 3) and comparing them with the last VAS Worry Stop Rule Checklist scores taken prior to ending the interview.

Figure 2 shows these two sets of scores for ‘as many as can’ and ‘feel like continuing’ stop rule measures. Pairwise comparisons of VAS AMA scores showed that AMA scores were significantly higher at the outset of catastrophising than at the end of the catastrophising task [ $t(48)=2.48, p<.02, r=0.17$ ]. A similar comparison of FL scores

showed that FL scores were significantly lower at the outset of catastrophising than at the end [ $t(48)=2.57, p<.02, r=0.14$ ]. A comparison of AMA with FL ratings at the outset of catastrophising showed that AMA ratings were significantly higher than FL [ $t(48)=3.87, p<.001, r=0.43$ ]. However, at the end of catastrophising AMA and FL ratings were not significantly different [ $t(48)=1.25, p>.2, r=0.15$ ].

In order to assess whether level of trait worrying (as measured by PSWQ) was related to changes in stop rule use across the catastrophising task, a stop rule difference score was calculated for both VAS AMA and FL measures by subtracting the final VAS stop rule rating from the rating at the outset of the task. There were no significant correlations between PSWQ scores and either AMA difference scores [ $r(49)=-.12, p>.2$ ] or FL difference scores [ $r(49)=.10, p>.2$ ], suggesting that changes in stop rule use across the task were unrelated to level of trait worrying. Similarly, there were no significant correlations between either AMA or FL stop rule difference scores and VAS mood measures at the outset of the catastrophising task (all  $r$ s  $<.16$ , all  $p$ s  $>.2$ )

## DISCUSSION

The results of Experiment 2 indicate that there is a significant shift away from endorsing the use of ‘as many as can’ stop rules over the course of the catastrophising task, and a significant increasing tendency to endorse the use of ‘feel like continuing’ stop rules. Previous studies have indicated that there are significant differences in the type of stop rule deployed by high and low worriers at the outset of a worry bout (Davey, Startup, MacDonald, Jenkins & Patterson, 2005), but these are the first findings to suggest that individuals involved in a worry task may either increase or decrease their tendency to deploy a type of stop rule over the course of a worry bout. Participants began the catastrophising task with a significantly greater tendency to endorse the use of

‘as many as can’ stop rules than ‘feel like continuing’ stop rules. However, by the end of the task there was no significant difference between the endorsement of ‘as many as can’ and ‘feel like continuing’. Although these findings suggest that there was no overall switch from using ‘as many as can’ to predominantly using ‘feel like continuing’ stop rules, the drift away from ‘as many as can’ to ‘feel like continuing’ stop rules was significant. It must also be remembered that only two examples each of AMA and FL stop rules were used to measure stop rule use during the task, and it is possible that these may not have been fully representative of the changes in stop rule use.

The fact that endorsement of ‘as many as can’ stop rules decrease and endorsement of ‘feel like continuing’ stop rules increase makes intuitive sense – especially if worriers feel they are unlikely to currently resolve any of the issues they are addressing in their worry bout. Increasingly deploying ‘feel like continuing’ stop rules towards the end of a worry bout implies that the worrier will be looking round for reasons to terminate the bout by asking themselves the question “do I feel like continuing this activity?”. If the worrier is experiencing high levels of negative mood, then this can be used as evidence that the activity should not be continued.

## **GENERAL DISCUSSION**

This series of two experiments was designed to address the question of what factors might lead a worrier eventually to terminate their worry bout. The mood-as-input hypothesis would predict that terminating an open-ended activity such as worrying should occur (1) when an ‘as many as can’ stop rule is deployed in the presence of a positive mood (indicating that the important goals of the activity have been met), or (2) when a ‘feel like continuing’ stop rule is deployed in the presence of a negative mood (indicating that the individual is not enjoying the task and should stop).

Experiment 1 indicated that – regardless of the stop rule that they were asked to deploy during the catastrophising task – worriers tended to show increases in negative mood and decreases in positive mood over the course of catastrophising. In Experiment 2, participants engaged in a catastrophising task exhibited a significant shift away from endorsing the use of ‘as many as can’ stop rules over the course of the task, and a significant increasing tendency to endorse the use of ‘feel like continuing’ stop rules.

These findings suggest that worriers are likely to terminate their worry bout by maintaining (and even increasing) levels of negative mood, but shifting away from the use of ‘as many as can’ to ‘feel like continuing’ stop rules during the course of worrying. Implicitly asking the question “do I feel like continuing?” in the context of a negative mood implies that the activity is no longer enjoyable or profitable and should be terminated.

First, the fact that worriers show increases in negative mood across the worry bout is consistent with the findings of Vasey & Borkovec (1992) who reported increases in emotional discomfort in chronic worriers across a catastrophising task. There may be a number of reasons for this increase: (1) the worry bouts of worriers may be characterized by asking “what if...?” questions to try and elaborate the range of possible negative outcomes associated with a worry topic (Kendall & Ingram, 1987), and, once elaborated, these negative outcomes may add cumulatively to experienced negative mood, (2) chronic worry is associated with poor problem-solving confidence (Davey, 1994a), and negative mood may be generated by lack of confidence in any solutions to their worries that the worrier has produced during the worry bout, and (3) detailed analysis of the catastrophising steps generated by high worriers indicates that personal inadequacies become a feature of catastrophising steps later in the catastrophising sequence regardless of the worry topic (Davey & Levy, Studies 5 & 6), and the recurrent appearance of these themes may evoke feelings of sadness at failure and personal incompetence.

Secondly, individuals participating in a worry task exhibit a shift away from ‘as many as can’ to ‘feel like continuing’ stop rules across the catastrophising interview. Together with the worrier’s increasing negative mood towards the end of the bout, a shift to a ‘feel like continuing’ stop rule would provide a set of circumstances in which mood-as-input hypothesis would predict an end to perseveration. However, the shift from ‘as many as can’ to ‘feel like continuing’ stop rules during worry begs two questions: (1) why the shift in the first place, and (2) what kinds of information might the worrier source to answer the question about whether they should continue? There is no obvious evidence for why worriers should drift from ‘as many as can’ to feel like continuing’ stop rules, but clearly this would be facilitated if worry represents a problem-solving process that is continually thwarted by poor problem-solving confidence (Davey, 1994ab). As the worrier begins the bout determined to resolve issues (using ‘as many as can’ stop rules), their continuing inability to do so may lead to the adoption of an attitude which asks ‘why am I doing this if I can’t resolve anything?’ (a ‘feel like continuing’ stop rule). Once ‘feel like continuing’ stop rules have been increasingly deployed towards the end of the bout, increasing negative mood is an obvious source of information that would imply that the activity should be terminated. For the high worrier, other sources of information could also be utilized to answer the question of ‘why continue?’. These include the chronic worrier’s lack of belief in their problem-solving ability (Davey, 1994a), and the negative self-referent statements that start to intrude into the catastrophising sequence (Davey & Levy, 1998). However, it is quite likely that all these factors are interlinked with negative mood to provide coherent and integrated information that the task should not be continued.

While the present studies provide some insight into the cognitive and emotional processes that may determine the length of a worry bout, they also identify some of the variables that may be important in helping chronic worriers to control their worry bouts.

For example, helping chronic worriers to identify the kinds of ‘as many as can’ stop rule they deploy at the outset of a worry bout should help them to begin to control the rules they use, and to provide insight into how the deployment of ‘as many as can’ stop rules in the context of negative mood leads to perseveration. The catastrophising interview may also be a valuable therapeutic tool by enabling the therapist to identify those negative cognitions that may intrude consistently into the catastrophising process and be a source of increasing emotional discomfort. With pathological worriers, this can demonstrate that these negative themes intrude across a range of worries, contribute to failure to bring closure to the process, and are a source of negative mood. Once identified, these themes can be isolated and challenged using more formal cognitive therapy methods (Davey, 2006).



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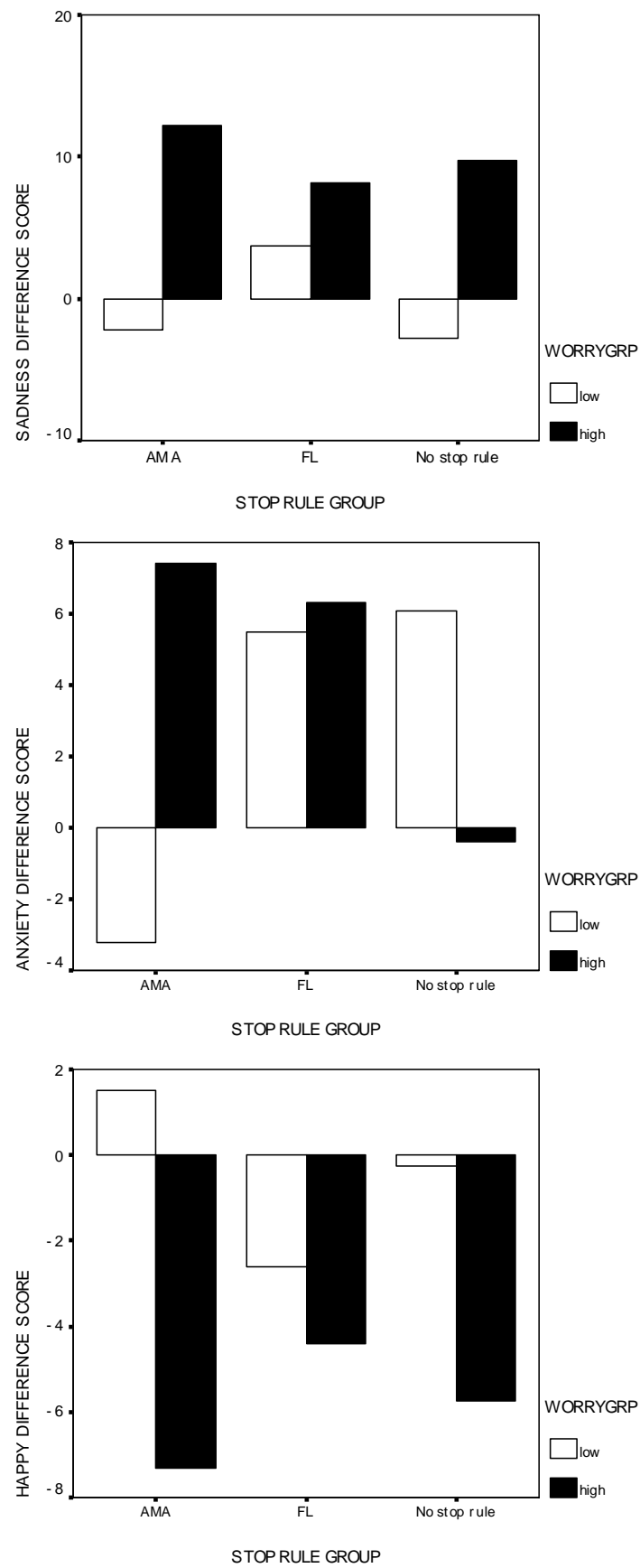
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### **FIGURE LEGENDS**

**Figure 1:** Mood difference scores (calculated by subtracting the mood score at the termination of the task from the mood score at the outset of the task) for all three mood measures for 'high worriers' (filled bars) and 'low worriers' (open bars) in Experiment 1.

**Figure 2:** Mean stop rule scores (AMA= 'as many as can', FL= 'feel like continuing') taken prior to or at the end of the catastrophising interview task for 'high worriers' and 'low worriers'.

**FIGURE 1**

**FIGURE 2**